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ABSTRACT

Designed to develop creativity in young learners, this book contains interdisciplinary activities which focus on the theme of water. Activity pages are provided that can serve as front and back covers of a student booklet and the suggested activities can be duplicated for insertion between the covers resulting in a booklet for each student. A teacher/parent guide is included and supplies background information, activity descriptions, materials needed, and possible answers for the activities. A variety of exercises are provided on such topics as: (1) the ocean's depth; (2) flow of water in an urban system; (3) water cycle; (4) water conservation; (5) water sports; (6) molecular structure of water; and (7) water/blood in the human body. (ML)

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GOOD APPLE

YOUNG SCIENTISTS EXPLORE

The World of Water

BOOK 9 INTERMEDIATE LEVEL

FD280711

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SE 047 873

YOUNG SCIENTISTS EXPLORE
THE WORLD OF WATER
Book 9 -- Intermediate Level
by **Jerry DeBruin**

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GREETINGS:
A MESSAGE TO TEACHERS AND PARENTS

Dear Friends,

Thank you for the many kind comments about my previous books, *Creative, Hands-On Science Experiences* (CHOSE) published by Good Apple, Inc., in 1980 and the first six books in the *Young Scientists Explore Series* published by Good Apple, Inc., in 1982 and 1983.

This book, *Young Scientists Explore The World of Water* is written as a result of your comments and suggestions, comments that suggested a need for handy science books that contain activity sheets which could be duplicated for students' use. *Young Scientists Explore The World of Water* is an attempt to meet this need.

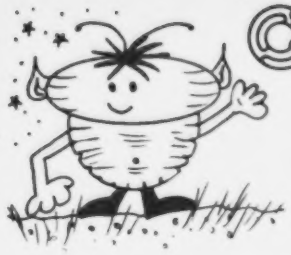
Young Scientists Explore The World of Water is the ninth in a series of books that feature science activity sheets which provide youngsters with a variety of interesting and challenging science-related experiences using experiments, puzzles, cutouts, hidden pictures, charts, and seek-a-words. Youngsters are encouraged to gain firsthand experience while doing the activities, for it is through firsthand experience that meaningful learning occurs. Emphasis throughout the book is placed on the development of creativity in the learner. It is hoped that this creativity will be nurtured both during and after the activities are done.

You as teachers and parents are encouraged to make duplicating masters, copies and transparencies from pages found in *Young Scientists Explore The World of Water.* The activities are interdisciplinary and nonsequential in nature and are meant to integrate and extend existing science instruction with other academic areas. To achieve this purpose, the book contains a Teacher/Parent Guide that supplies background information, including the title, major concept and materials needed for each activity plus a brief description on how to teach the activity with possible answers. When completed and mounted on single-layered cardboard and bound with tape, activity sheets 4 and 5 make up both the front and back covers of the Student Booklet. Completed student activity sheets can then be inserted between these covers and placed in a three-ring binder or file folder with the result being a permanent booklet for each youngster.

It is hoped that these activity sheets will touch many minds, hearts and hands and that much personal growth is experienced by all who do the activities. Keep in touch. Let me know how you are doing. It is always good to hear from you. Until then, best wishes in your continued growth as a scientist and as a complete human being.

Sincerely,

Jerry DeBruin



Greetings

Hello. My name is ANHYDROUS. I come from planet ARID found in the great galaxy of ANDROMEDA. When I visit planet EARTH, located deep in the MILKY WAY galaxy, I observe a strange-looking substance that covers nearly three-fourths of your planet's surface. I have never encountered this odd-looking substance anywhere before in my travels throughout the universe. Quite frankly, I am curious about what this mysterious substance might be. To understand and live in peace with you Earthlings, I need to find out more about both this substance and you. You can help me by becoming a special investigator on a top secret mission whose objective is to identify the substance and unlock its many secrets. Before you begin your mission, however, I need to know more about you. Fill out the application below. The completed application will tell us how well qualified you are to go on this mission.

APPLICATION

Name: _____
last first middle

Phone: _____ Grade: _____ School: _____

Address: _____
street city state zip

Place of birth: _____ Birthdate: _____
city state day month year

Citizen of USA: yes__ no__ Citizen of Planet Earth: yes__ no__

Color of hair: _____ Color of eyes: _____ Complexion: _____

Most interesting subjects studied in school: _____

Your strengths: _____

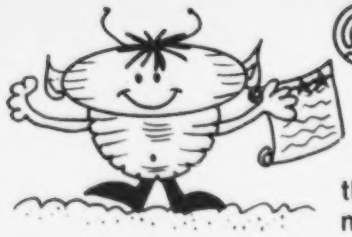
Your weaknesses: _____

The name of a person who could recommend you: _____

***

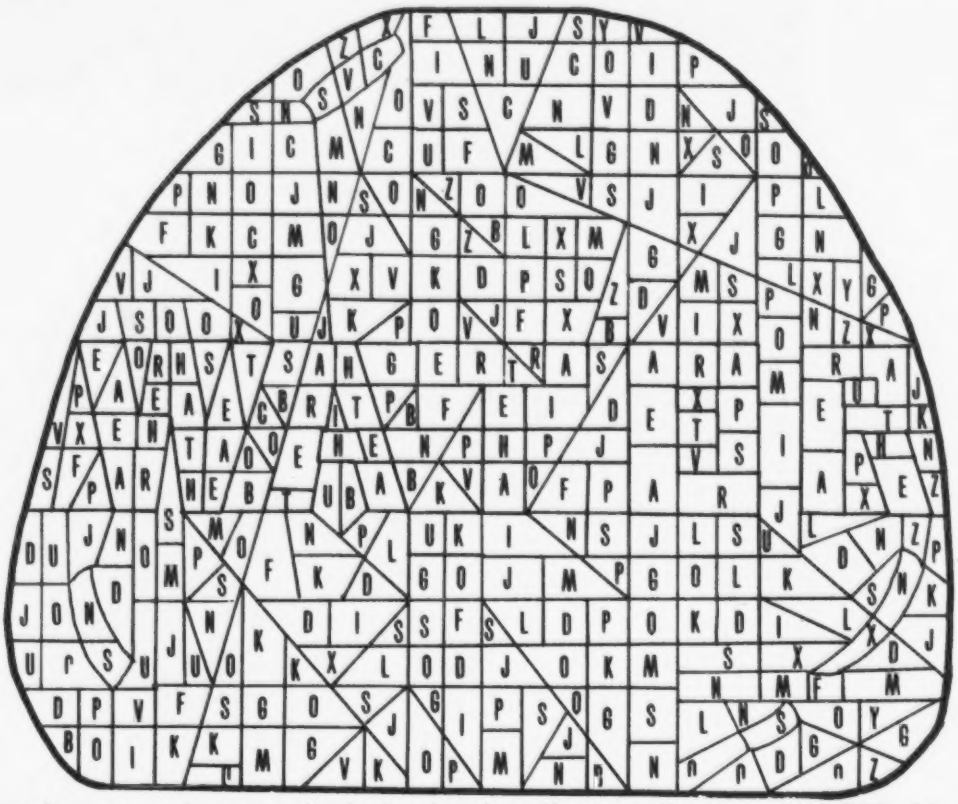
I authorize investigation of my statements made above. I understand that any untrue statement of important information that I left out is cause for my not being able to go on the mission.

Signature _____



Congratulations!

Members of the Personnel Department in my agency have completed the review of your application. They assigned you to category A-1 which means you have top secret clearance to go on this mission. However, you need to do the following activity to learn more about your mission. With a pencil, shade in the letters E, A, R, T,H below to accomplish this task. Then color the shaded areas blue, the remaining areas yellow.

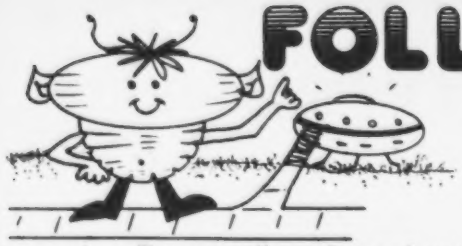


You now know your top secret mission involves the investigation of WATER. Start to gather equipment needed to carry out your mission. Check (✓) the box as you collect each item.

- ☐ soda straw or eyedropper ☐ scissors ☐ glue
- ☐ plain tap water and soapy water ☐ cardboard ☐ encyclopedias
- ☐ 8 ½" x 11" food storage bag or sheet of plastic wrap, Baggie, transparency film or waxed paper ☐ zip code directory or almanac
- ☐ soap ☐ small box ☐ string ☐ ruler ☐ wristwatch or clock
- ☐ penny ☐ large plastic soda bottle ☐ water bill from home
- ☐ pencil, colored pens or markers ☐ comb ☐ medicine cup
- ☐ paper towels ☐ magnifying glass ☐ thin wire ☐ metal spoon
- ☐ food coloring ☐ cup or glass ☐ construction paper
- ☐ dictionary ☐ ice cubes ☐ blotter or filter paper or paper toweling

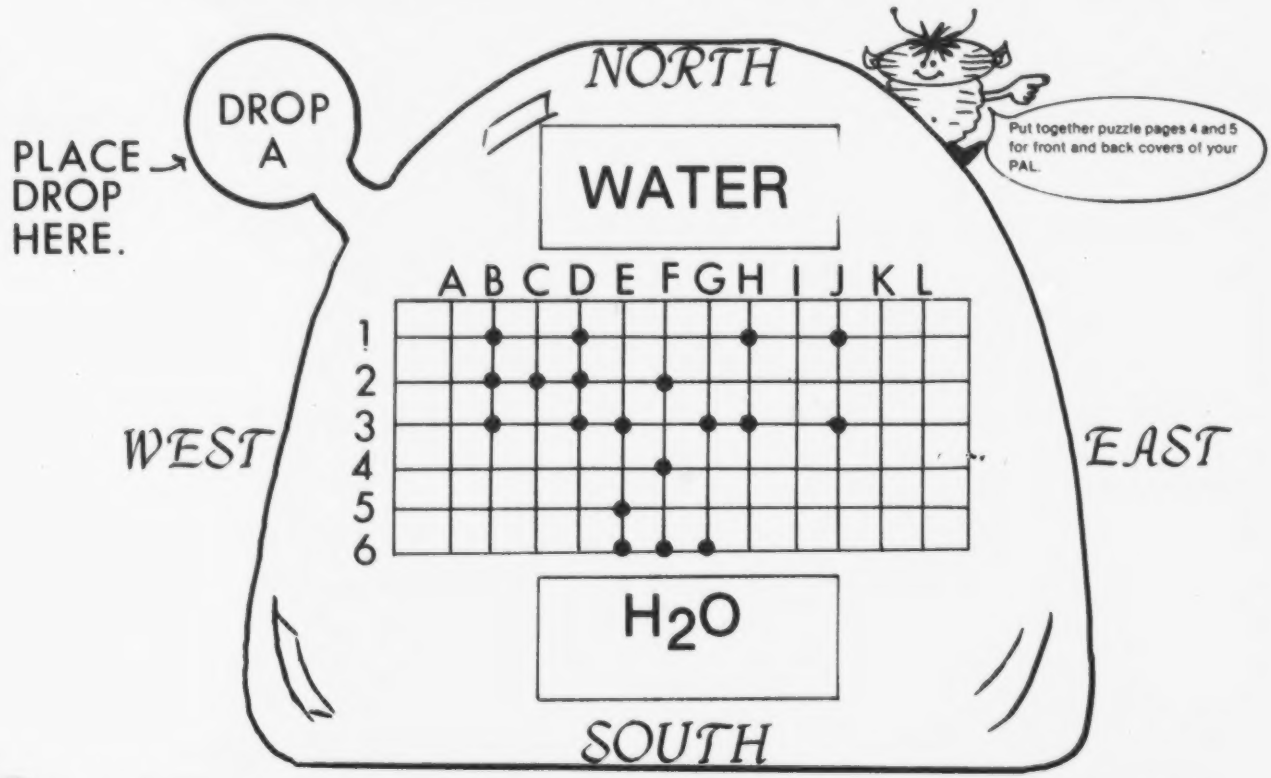
Learn more about your secret mission by following directions on the next page.

FOLLOW DIRECTIONS



As an expert investigator on this mission, you will need to follow these directions from agency headquarters.

1. Be sure all equipment works. Use a plastic bag to store equipment. For some activities, place activity sheet in a plastic food storage bag. A sheet of plastic wrap, transparency film or wax paper placed over the activity sheet also works well.
2. Use eyedropper to collect drops of water after activity is completed. Try not to spill water. Clean up after each activity.
3. Pages 4 and 5 are puzzle pages that, when put together, make up the front and back covers of your Personal Activity Log (PAL). Write and draw frequently in your PAL. Use a three-ring binder or file folder to store completed activity pages.
4. Follow directions carefully on each page. Here's your chance to convince me that you have this ability. Using a pencil, follow the three steps below.



1. Place pencil on dot B1. Draw a line south to dots B2 and B3. Return to dot B2. Draw a line east that connects dots C2 and D2. From dot D1 draw a line south that connects dots D2 and D3. 2. Place pencil on dot E3. Draw a line northeast that connects dots E3, F2, (northeast), G3 (southeast) and F4 (southwest). Proceed southwest from F4 to dots E5 and E6. Go east to dots F6 and G6. 3. Starting at dot H1, connect dots H3 (south), J3, (east), J1 (north) and return to H1 (west). You have now drawn H_2O the symbol for water. The letter *H* means ***hydrogen,*** the numeral *2* means ***two,*** and letter *O* means ***oxygen***. Together these three things called ***atoms*** make up a ***molecule*** of water.

Slip activity sheet into plastic bag. With an eyedropper, place drop of plain tap water in circle A. Pull drop of water to dot B1. Add drops to other dots. Connect dots with water to form H_2O. In the boxes in the drop above, write the symbol H_2O above the word ***south*** and the word ***water*** below the word ***north.*** Congratulations on your ability to follow directions.

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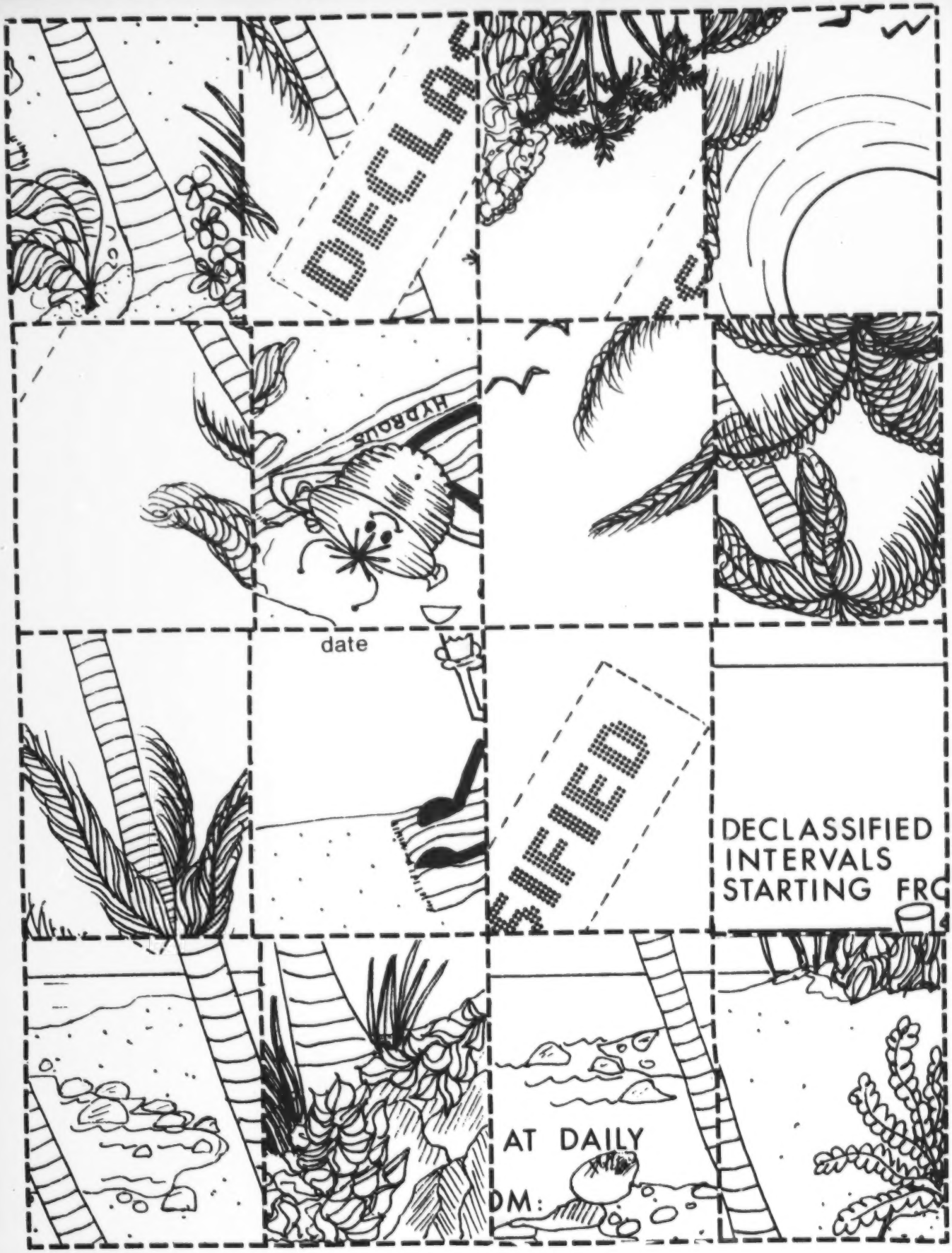
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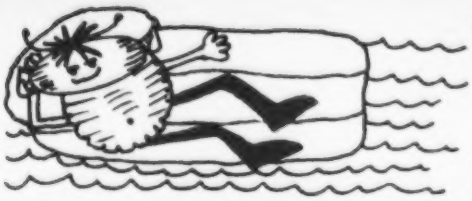
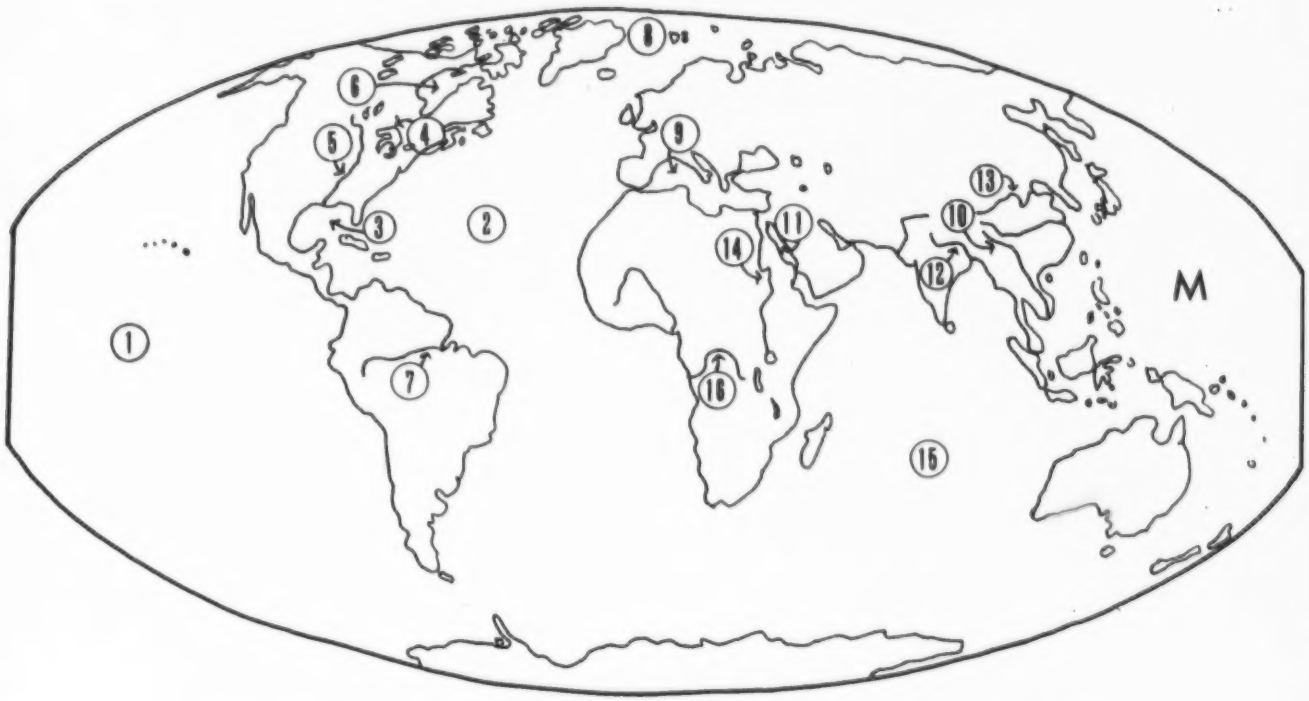


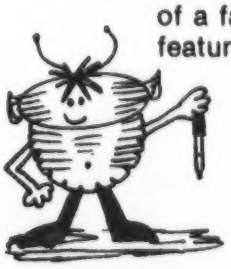
WATER'S WAY

On page 1, I notified you upon my arrival that a strange-looking substance covered nearly three-fourths of your planet's surface. Since then, I've learned that this substance is WATER. I'd like to learn, however, the names and locations of some of these large bodies of water on planet Earth. Below is a map of planet Earth. In the blank next to the name of the water feature, write the map number that shows the location of that water feature. This will help me locate the major areas of water on planet Earth. Color the water areas blue, the land areas green.



___Arctic Ocean
___Pacific Ocean
___Atlantic Ocean
___Indian Ocean
___Hudson Bay
___Gulf of Mexico
___Mediterranean Sea
___Red Sea
___Mississippi River
___Amazon River
___Congo River
___Ganges River
___Mekong River
___Yangtze River
___Nile River
___Great Lakes

Slip activity sheet into plastic bag. With an eyedropper, place one drop of plain tap water on each numbered circle above. Connect circles with water to show worldwide unity. Name at least one country that each water feature touches. Then write a news biography of a famous person such as Jacques Cousteau, who has explored one of these water features.

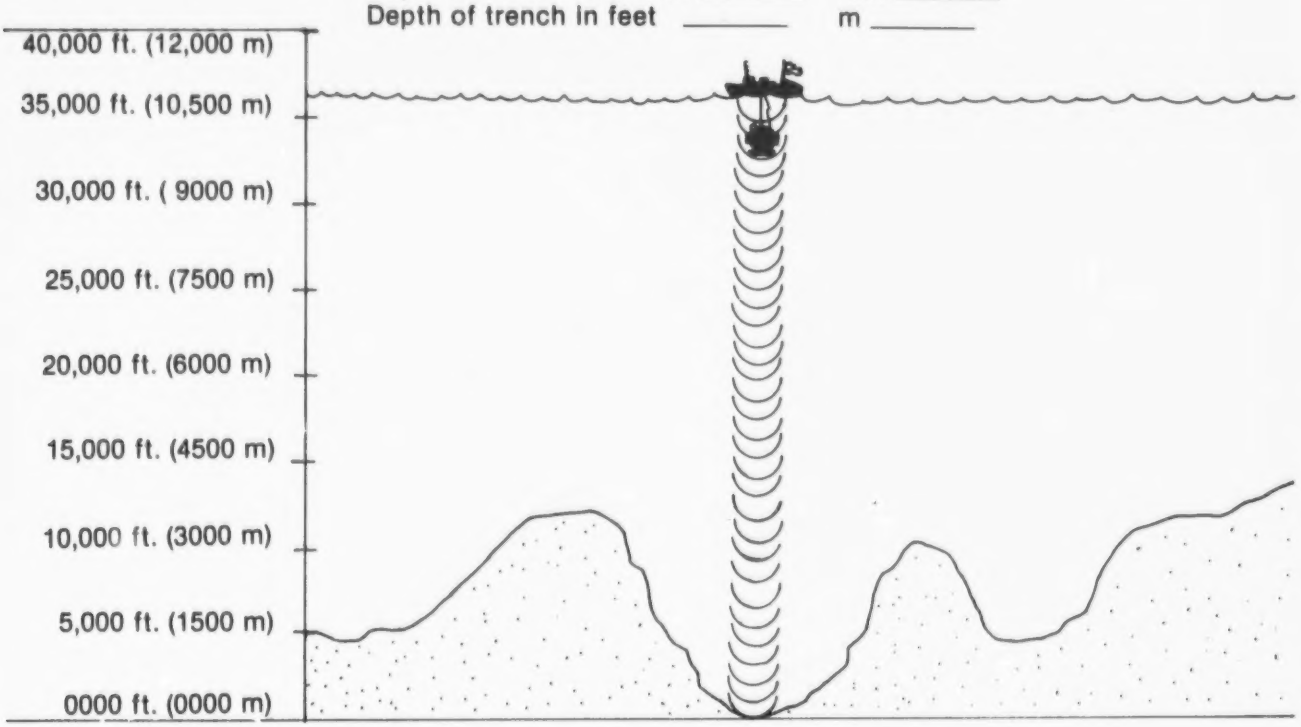


Now, help me learn more about planet Earth by taking a trip into the MARIANA TRENCH IN THE P ___ ___ ___ ___ ___ ___ OCEAN. This trench is located by the letter _____on the map above.

OFF THE DEEP END

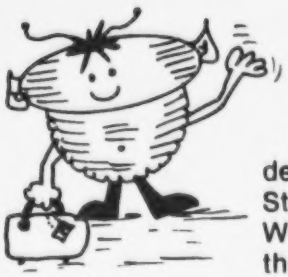
The Pacific "peaceful" Ocean is planet Earth's largest and deepest body of water. It contains the Mariana Trench near the island of Guam. This trench is the deepest known spot in any ocean on planet Earth. Help me explore the depths of this trench further. With a ruler or string, measure the depth of the trench in the picture below in inches (cm). Record your answer in the blank below. Use the scale to learn the depth of the trench in feet (m). Record. Now, let's board our craft and take a deep dive to the bottom of the ocean floor.

Depth of trench in inches _____ cm _____
Depth of trench in feet _____ m _____



Place this sheet in plastic bag. Put drop of water in the boat. Pretend that you are a deep sea diver and the drop of water is your craft. Tilt paper so craft dives to the bottom of the ocean. On the other side of this sheet, write a story about the plants, animals and other creatures you see while on your trip. Let your friends write an ending to your story.

Make your own ocean diver. Fill a large plastic soda bottle with water. Partially fill eyedropper with water and place in soda container. Screw on top. Squeeze sides of bottle to make diver go to the bottom. Release. What happens? Why? Look up the word *bathysphere* in your dictionary. Tell what it does. Then interview a diver on what "the bends" are and report the results of your interview to the class.



ONCE-IN-A-LIFETIME TRIP

I've observed planet Earth's blue sky from above and explored parts of its deepest ocean from below. Help me learn more about your country, the United States of America, by taking a trip down its longest river, the Mississippi River. With string, measure the length of the river in inches (cm). Record your answer in the blank below. Using an encyclopedia, find out in miles (km) the length of the river. Record. Look up and read Mark Twain's *The Adventures of Tom Sawyer.* Invite Tom to take a trip down the river with us.

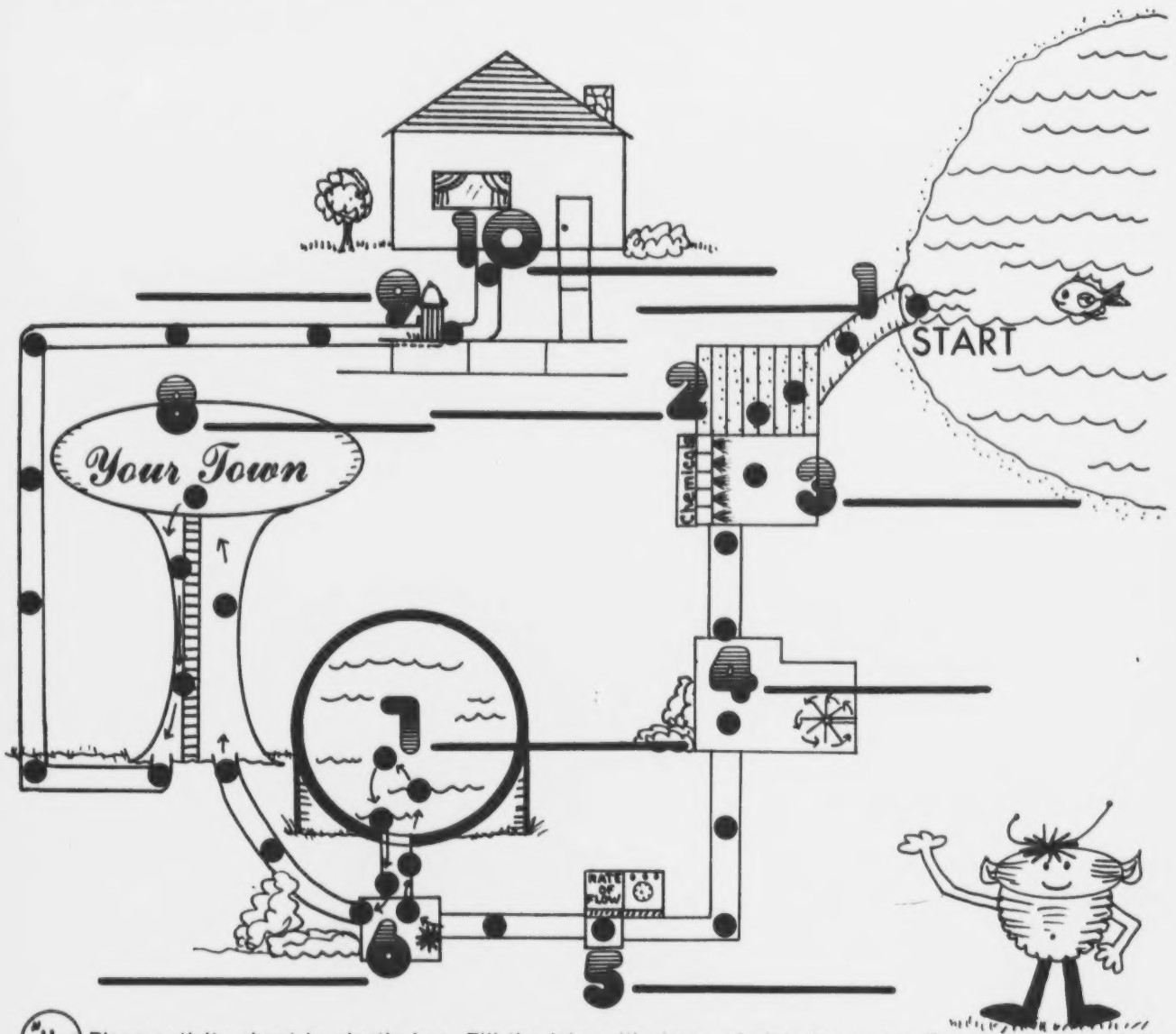
River in inches _____ (cm) _____
River in miles _____ (km) _____
Miles (km) per inch (cm) = _____ ( )

Insert sheet into plastic bag. Place drop of water in circle A. Tilt paper so drop flows down the Mississippi River into circle B. Name the states you touch. Repeat to show the route you would take on your favorite vacation. Tell the highlights of your trip. Use eyedropper to collect drops. Remove sheet from plastic bag. Write the following zip code abbreviations on the states that you touched while on your trip: MS, LA, WI, KY, MO, AR, IL, TN, MN, IA. Then from an almanac or zip code directory, locate New Orleans and write its code in this blank _____.

A trip down the Mississippi River in a drop of water helped me learn the names of some states in your country. These states seem to have a lot of water. I've heard, however, that some states, especially in the southwest, are very dry. On the map above, draw the path of a planned pipeline that would carry water from the Great Lakes to the southwest states. Then travel this pipeline route in a drop of water. Remember to place activity sheet in a plastic bag before you start on your trip.

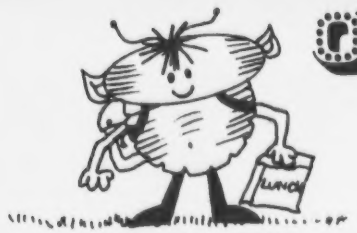
Home Sweet Home

Starting at the lake, connect the dots in the picture below to show the flow of water to your home. At each of the numbered stops, choose from the words below and write the *letter* of the name of the stop in the corresponding blank. Find out what happens to the water at each stop on its way to your home. Words to choose from: a. fire hydrant, b. filter beds, c. meter pit, d. water intake, e. storage tank, f. house water meter, g. water treatment, h. pumps, i. storage tank pumps, and j. water tower.



Place activity sheet in plastic bag. Fill the lake with drops of plain tap water. Count, then record, the number of drops below. Fill the pipes from the lake to your home with water. Trace the path of water to your home. Where would water come from if there was no lake? With help from your parents find out how many gallons (ℓ) of water you use per month. Then find out how much you pay for both water and sewage services per month. Figure your total monthly water bill below.

1. Number of drops needed to fill lake _____
2. Gallons ( ) of water used per month _____gallons (_____ℓ)
3. Cost of water per month $_____
4. Cost for sewage services per month $_____
5. Total cost for water and sewage $_____



OFF TO SCHOOL!

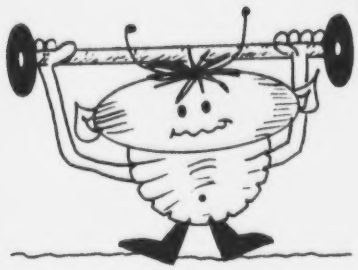
I've learned how water on your planet travels to your home and keeps you alive. I've also learned how good it feels to visit your home. Now, help me find out how water is used at school. In the picture below, circle the objects found in school that have water in them. Clue: The total number of hidden water objects in the picture equals two dozen plus two.

Place sheet in plastic bag. Put a ring of water around each hidden water object. Describe what you see.

Then, on the other side of this page, make a hidden word puzzle that has the names of objects in which water is hidden in your school.

I now understand how water is used to maintain life at school. I've learned that one cannot live without water. Let's take a closer look at water now and study some of its features which are much like those found in humans on planet Earth.

STRENGTHS

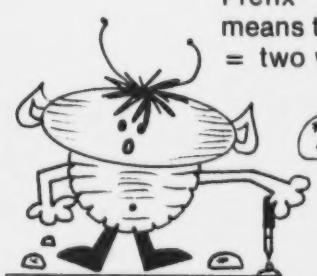


I reread your list of STRENGTHS on page 1 of your Personal Activity Log (PAL). It's interesting because water, too, has certain strengths. Use the clues below to help me find and circle six words that describe some strengths of water.

S	K	C	O	H	E	S	I	O	Z	L	M	T	U
P	H	A	B	J	H	A	R	L	I	H	Q	R	V
F	D	A	P	K	T	M	G	A	D	H	E	S	I
G	R	Q	R	M	B	O	N	E	N	U	B	R	T
Y	N	V	F	D	O	L	W	K	D	X	E	B	Z
S	U	R	F	A	C	E	T	E	N	S	I	O	N
A	S	H	B	P	I	C	F	G	C	Q	Y	N	Z
O	M	O	L	E	C	U	D	X	K	R	G	D	X
I	V	E	S	J	N	L	E	J	W	D	L	S	Z
N	S	R	A	D	H	E	S	I	O	N	T	B	H
Q	J	C	O	H	E	S	I	O	N	O	M	U	P
S	U	D	N	K	L	V	T	F	W	E	L	F	A

Clues:

1. Opposite of soft = H ___ ___ ___, 2. A "mole" is found in this word = MOLE ___ ___ ___ ___ ___, 3. U.S. Savings B ___ ___ ___ ___, 4. Prefix "ad" means away = ADH ___ ___ ___ ___ ___, 5. Prefix "co" means together = COH ___ ___ ___ ___ ___, 6. Uptight on the surface = two words = SU ___ F ___ ___ ___ T ___ ___ ___ ___ ___N.



Place sheet in plastic bag. With eyedropper, place drops of water on each circled word above. (First do one word; then wipe water off plastic; then do second word.) Count the number of drops needed to fill each word. Add up the total number of drops needed. Record the *average* number of drops per word in this blank _____.

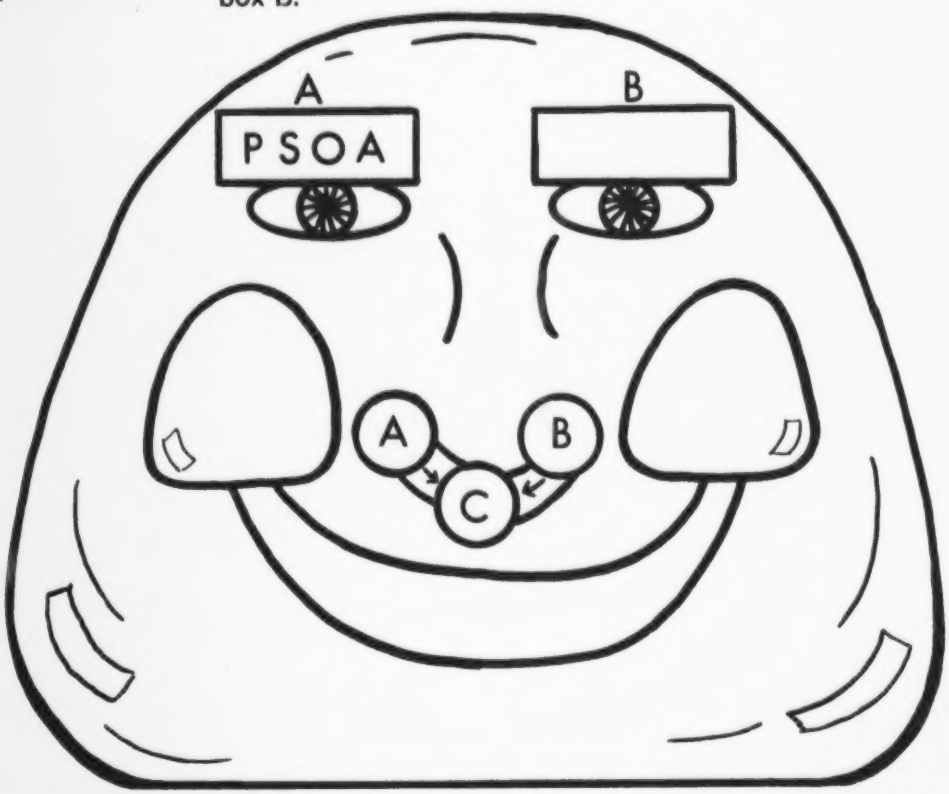
I've learned that water has a number of strengths. On the other side of this paper, write the strength words of water in alphabetical order and define each. Then, before doing the next activity, make a list of at least two of your strengths not mentioned previously on your application form. These strength words will be added to your confidential file kept at headquarters.

Note:

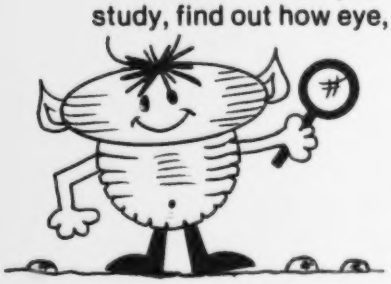
Some of your physical strength words may include information on how many pounds (kg) you can lift as a weightlifter. List other nonphysical strength words such as *courage* and *honesty*.

WEAKNESSES

I noticed that you also listed some of your weaknesses on the application blank. I've heard that water, too, can be made very weak. Rearrange the letters in box A below to identify the name of something that causes water to become weak. Write that name in box B.



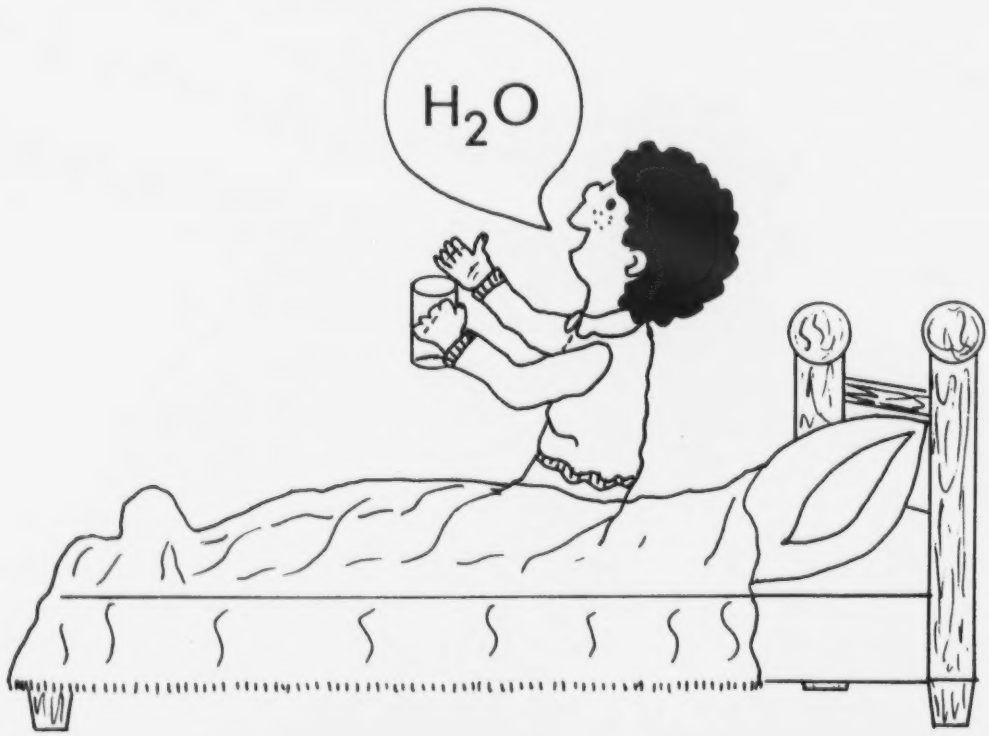
Slide sheet into plastic bag. With an eyedropper, place a drop of plain water in circle A on the nose in the picture above. Place a drop of *soap* in circle B. Observe. Place a drop of plain water in circle C. Add drop of soap. Mix the two drops together. With a magnifying glass, examine the new drop in circle C. Pretend that you are the new drop. Write a documentary story that describes the action when you meet the new drop. Be sure to tell about the changes in your new drop. Add food coloring to each drop. Mix drops to make new colors. With crayons or markers, draw a picture of your new drops. Then ask a friend for advice on what you could do to help make the water strong again. To complete your study, find out how eye, ear, and nose drops, if used correctly, can make you strong again.



Wow! Through this activity I've learned that water has certain weaknesses. Now, write the name of one of your weaknesses on the smile above. Then do at least one activity today that would improve that weakness. Be sure to keep a record of your attempts in your PAL after you review what your PAL is on page 3.

WATER FUN

Throughout this book, you and I have had a lot of fun doing water activities. In fact it is very important to have fun in life. Let's have some more fun by doing the activity below. The child in the picture shouts the secret code H_2O. Because you and I already encountered this symbol on page 3, we know that the child wants W_ _ _ _.



Place activity sheet in a plastic bag. With eyedropper, drop plain water drops on the symbol H_2O above. Gently tilt the page so the water runs into the youngster's glass. Count the number of drops needed to fill the glass. Then tilt the page so water runs into the youngster's mouth. Fill "start here" drop on scale with plain tap water. Tilt page. Count the number of spaces on the scale that the stream of water travels before it breaks up into separate drops. Next, try streams of soapy water and liquid soap. Does a stream of liquid soap break up before plain or soapy water? Record results in chart. On the other side of this paper write your favorite joke or riddle or design a humorous bumper sticker. Be sure your joke, riddle or bumper sticker makes the youngster smile a lot.

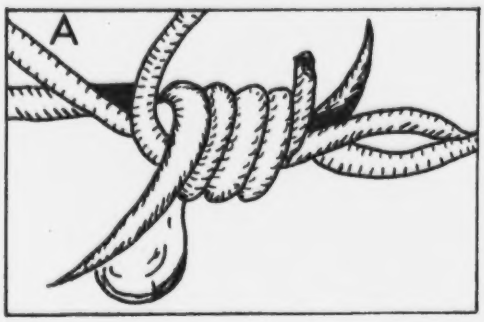
Water Type	# of Spaces Traveled
Plain Tap Water	
Soapy Water	
Liquid Soap	

START HERE

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30

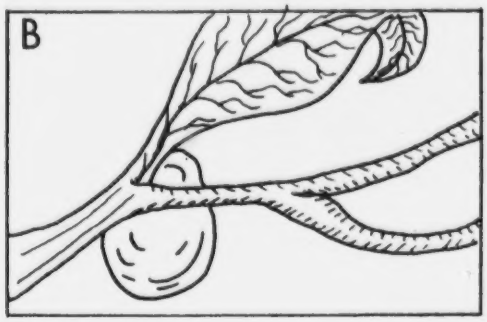
HANGING IN THERE...

Congratulations on making another person happy. Sometimes, however, we experience things that keep us from being happy. We can use codes though, to boost our confidence. One code is to "hang in there." I remember I had to "hang in there" when I tried several times unsuccessfully to reach planet Earth. I "hung in there" and finally made it. One of the first things I observed on planet Earth was that water also "hangs in there." Such is the case in the four pictures below. In the blank below each picture, write the name of the object from which each drop hangs.



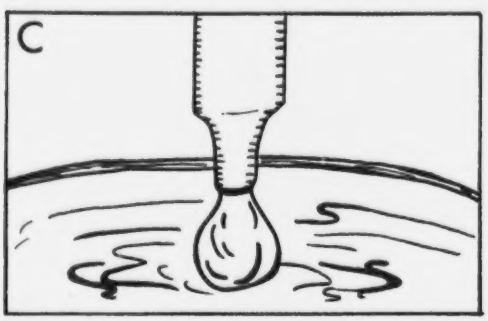
OBJECT: _____

NUMBER OF REGULAR: ◠ NUMBER OF SOAPY: ◠



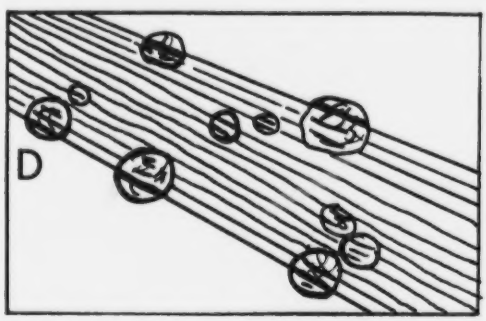
OBJECT: _____

NUMBER OF REGULAR: ◠ NUMBER OF SOAPY: ◠



OBJECT: _____

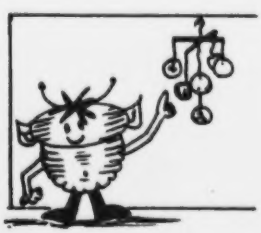
NUMBER OF REGULAR: ◠ NUMBER OF SOAPY: ◠



OBJECT: _____

NUMBER OF REGULAR: ◠ NUMBER OF SOAPY: ◠

Place activity sheet in plastic bag. Fill the shape of each drop in the pictures above with drops of plain tap water. Record the total number of drops needed to fill each drop in the "regular" water drop found below each picture. Repeat with soapy water. Record. Can you fit more regular plain water or soapy water drops in the drops? Which drops "hang in there" the longest before they spill over the outline of the drop? Record your results, regular or soapy water, in this box.

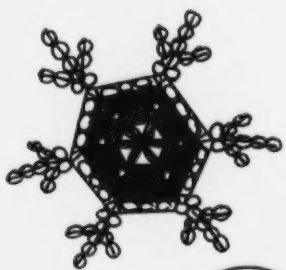


Mobiles are balanced objects that "hang in there." Make a balanced mobile that has pictures of people or things that have "hung in there." Hang from ceiling for all to see. Hang in there. It's time for a change.

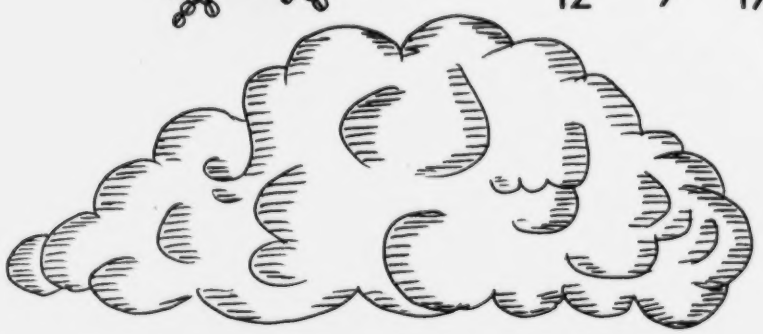
CHANGES IN STATE

By doing these water activities, I've learned a lot about myself. I know my strengths and weaknesses. I've also learned to "hang in there" even when things aren't going my way. Like water, I've learned to accept changes as they come about and flow smoothly with them. Help me further investigate some of these changes. Write the numbered letter of the alphabet in each blank below to spell words that note changes in water.

$\overline{19}$ $\overline{15}$ $\overline{12}$ $\overline{9}$ $\overline{4}$



$\overline{12}$ $\overline{9}$ $\overline{17}$ $\overline{21}$ $\overline{9}$ $\overline{4}$

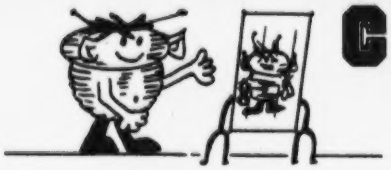


$\overline{7}$ $\overline{1}$ $\overline{19}$

Good work. Water changes from a *solid* to a *liquid* to a *gas*. Place activity sheet in plastic bag. Put small piece of ice on the *solid* above. With a watch or clock, time, in minutes, how long the ice takes to melt. Record your answer in the picture of the *liquid* above.

You can observe water as it changes from a solid to a liquid but not from a liquid to a gas because a gas is invisible. You can observe the effects of water in the air, however, by looking at water droplets on the outside of a glass that is filled with ice cubes and cold water on a hot summer day.

In a diary-scrapbook record some changes you've gone through while growing up. Interview your parents or an older student and record changes they've experienced in their lives. Make or collect pictures that show these changes. Paste in order by age in diary-scrapbook. Label each picture with date and age.



CHANGES IN IMAGE

You have taught me how water flows smoothly through various changes. I notice too that people on planet Earth try to do the same. Water can create other changes with its smooth flow. Help me learn how water can change a person's image. Place penny alongside figure A. Draw what your penny looks like in figure A. Observe print size of words, date and mint symbol. In figure B, notice that 19 ___ ___ is the year in which the penny was made and D ___ ___ ___ ___ ___, in the state of Colorado, is the city in which the mint is located. I wonder what the words "In God We Trust" mean. Can you find out? How is your penny in figure A different from the penny in figure B?

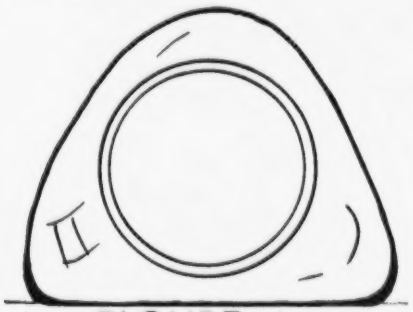


FIGURE A

FIGURE B

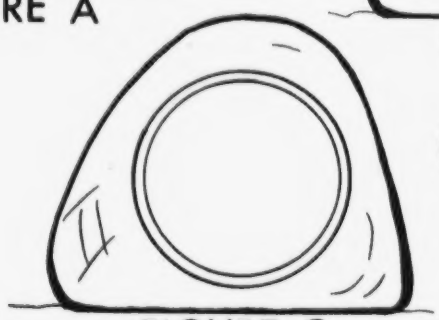
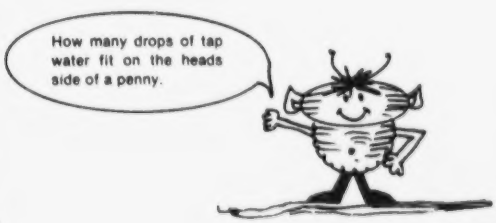


FIGURE C

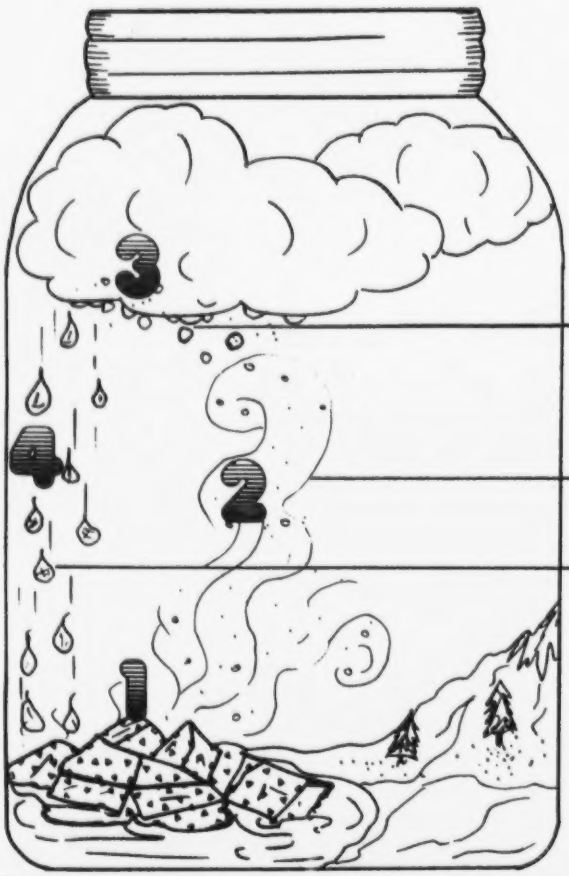


Place activity sheet in plastic bag. Fill top half of penny in figure B with drops of water. Compare size of letters to letters in lower half. What has water done to change the image? Fill penny with water. Observe how water heaps up on the penny. In figure C, draw what the image of the penny in figure B now looks like. Study how water can be used as a magnifying glass. Examine the shape of the glass in a magnifying glass. How is it like a drop of water? Observe eyeglasses and contact lenses. How are they shaped? Look at your image in the caved in side of a spoon. Flip spoon over. How has your image changed? How is a spoon like a lens and a lens like a drop of water?

I now understand how water can change images and possibly improve your image and outlook on life. What does the future hold? Find out by making a time line that shows changes in your image for the next fifteen years in your life. Include information on your occupation and life style. Show members of the class how you might dress and what you will be doing. Be sure to make plans for an extraterrestrial space flight to visit me on planet Arid. Develop a flight plan for such a mission.

WATER: THE CYCLE OF LIFE!

On planet Earth, water travels in cycles as it changes from a solid to a liquid to a gas and back again to a liquid and a solid. In the bottle below, put an *S* on the solid ice cubes, an *L* on the drops of water and a *G* on the gas in the clouds. Water on planet Earth goes through three stages in the water cycle. Unscramble the letters below to identify these changes.



DEONTINOASCN
_ _ _ _ _ _ _ _ _ _ _ _ _

RAPOAVNOTIE
_ _ _ _ _ _ _ _ _ _ _ _ _

ARECPITIPONIT
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _

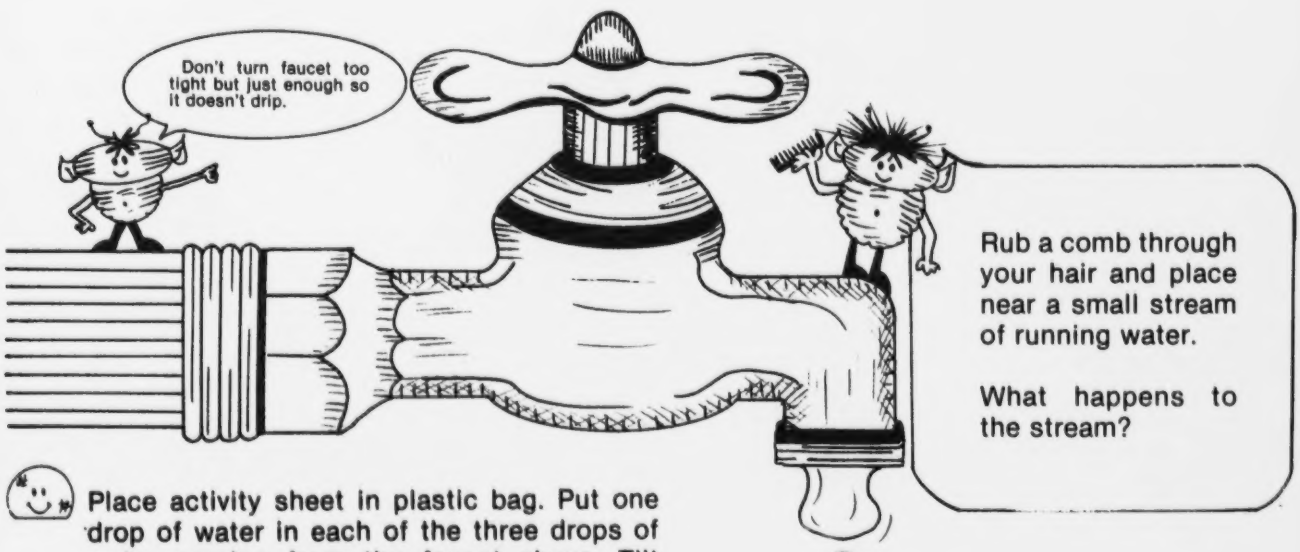
Place activity sheet in plastic bag. Using an eyedropper, place a drop of water on 1. Tilt page so drop travels between these points: 1-2-3-4-1. This shows how water travels through three stages in the water cycle. Name each stage. Remove activity sheet from plastic bag.

I've learned that there are three stages in the water cycle: evaporation, condensation and precipitation. On the other side of this page, write and define these three words. Then set up and observe your own water cycle by using a plastic bottle and materials shown above.

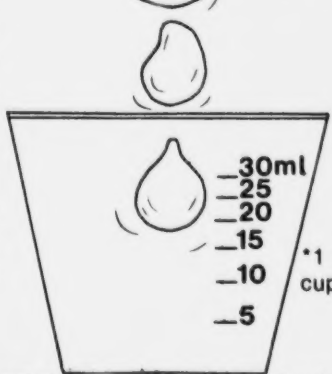
I've heard that humans too can recycle parts of their bodies. On the back of this page, design a bumper sticker that shows your feelings about the statement "Recycle Yourself: Sign a Kidney Donor Card."

RECYCLE WATER!

I understand that the water cycle goes on and on but I wonder how long it will last. I notice that people on planet Earth are encouraged to conserve water. Help me find out how one conserves water. We already know the symbol for water. Print the symbol, one letter per drop, in the three drops coming from the leaky faucet below. On the back of this page, write what you think water conservation means. Then investigate how much water can be conserved by repairing the leaky faucet below.


Don't turn faucet too tight but just enough so it doesn't drip.
Rub a comb through your hair and place near a small stream of running water.
What happens to the stream?

Place activity sheet in plastic bag. Put one drop of water in each of the three drops of water coming from the faucet above. Tilt paper so water runs into the medicine cup below. Each drop drips from this leaky faucet at a rate of one drop per second. The number of seconds needed for the faucet to leak the above three drops is _____ seconds. Find out the number of drops needed to fill one ml in an actual medicine cup. Then find out the number of gallons (liters) of water wasted per year at this rate.



*1 ml in an actual medicine cup = _____drops.

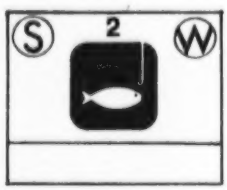
Cut out the poem below and pin it to the bulletin board in your bedroom. Read each day before you go to bed. Then you'll know that you haven't wasted any water, time or yourself.

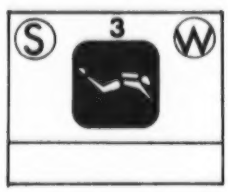
How pleasant it is at the end of the day...
No follies to have to repent.
But reflect on the past, and be able to say,
That my time has been properly spent.

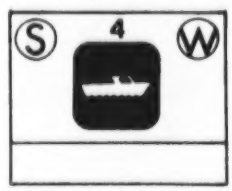
WATER SPORTS

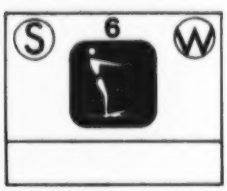
On my approach to planet Earth, I looked out the window of my spacecraft and spotted a sports village. It looked strange to me. However, with your help, I learned that many Earthlings participate in sports. Help me make a film of the water sports below. Cut out each square. Glue to frame on film. Use the picture clue on each frame to name the water sport. Write these names on the film frames. Then color in the circle that best tells whether the sport is a summer (S) or winter (W) sport or both.

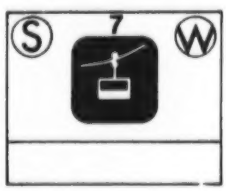
Make a thin loop of wire like this . Dip loop in water. Look through water loop at each frame. What do you see? How does water act like a magnifying glass? Make a soap bubble blower from your wire loop. How is a bubble like a domed sports stadium? Name some sports played in such a stadium.

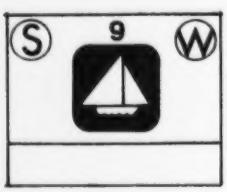


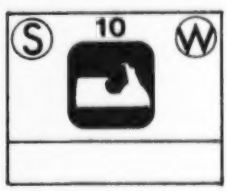


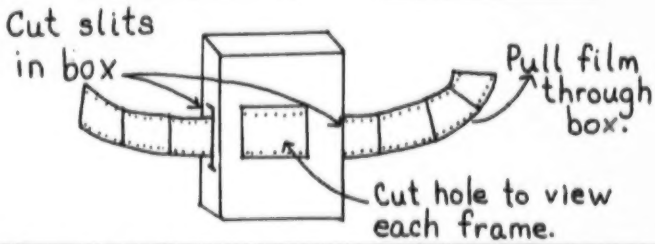


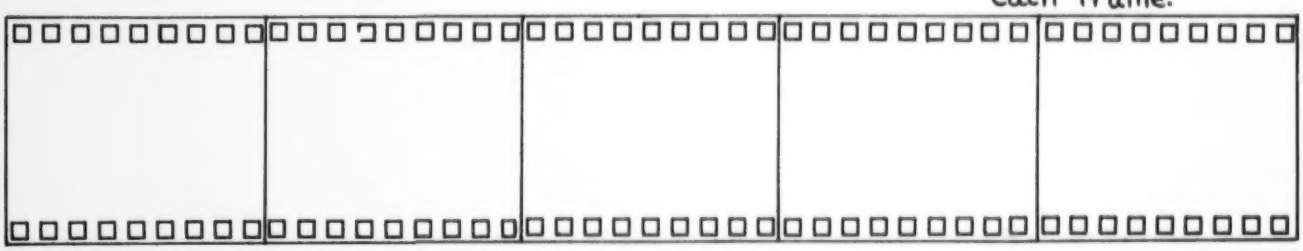


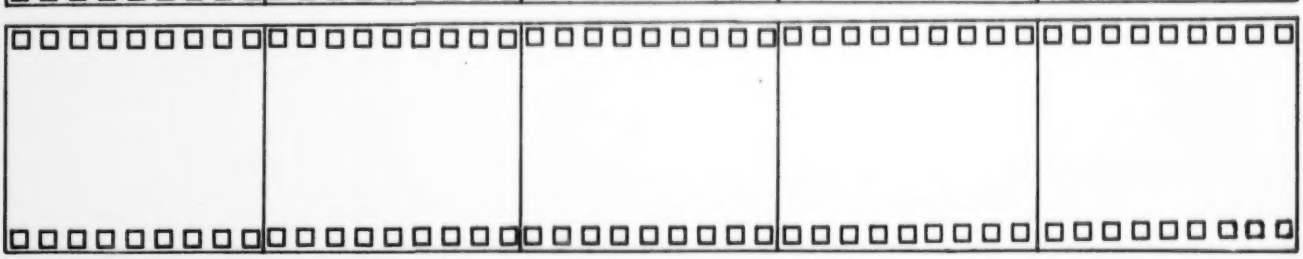






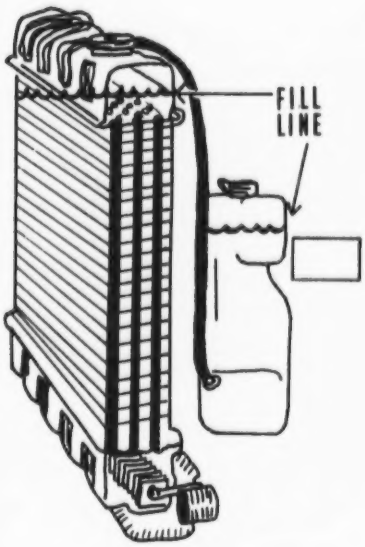


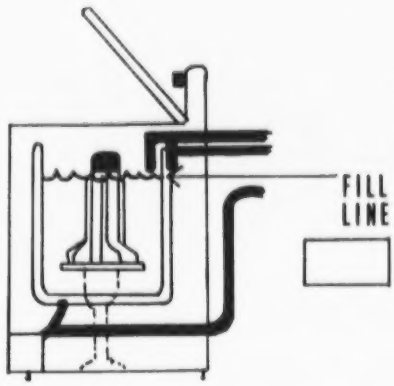


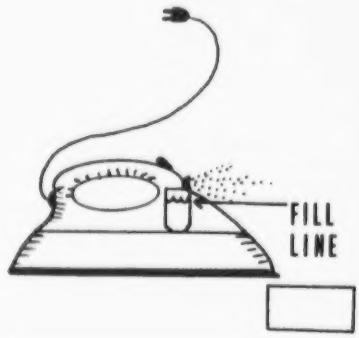


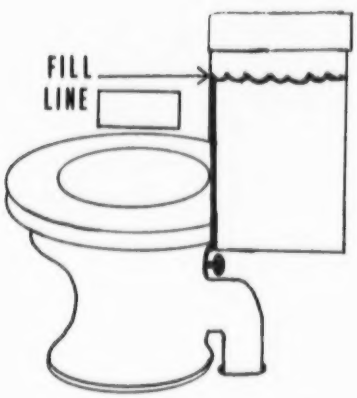
WATER OBJECTS...

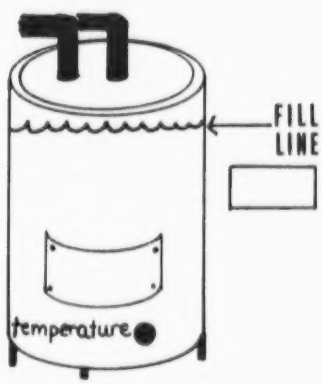
After I touched down on planet Earth, I observed many objects that use water in order to operate effectively. Below are some of those things. Write the name of each object in the blank under the picture.

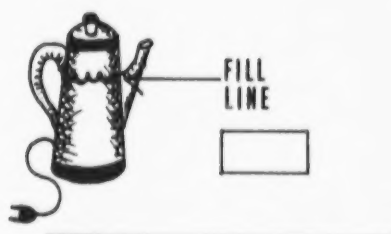


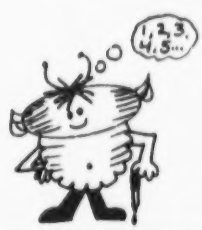






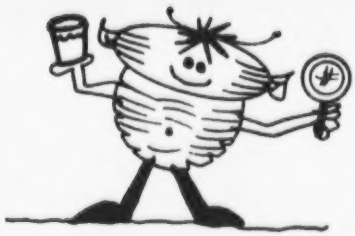






Place activity sheet in plastic bag. With an eyedropper, fill each object above to the proper level with water. Count the number of drops needed to fill each. Record number of drops in the box by the fill line. Then with your parents' help, find out how much actual water each of these objects holds.

The activities on the next several pages will give me a final look at water and you.



One Last Glimpse At Water

Before I leave planet Earth, I want to take one final look at a water molecule. On page 3, we learned that a water molecule has two atoms of *hydrogen* and one atom of *oxygen*. In figure A below, color the hydrogen (+) atoms yellow and the oxygen (–) atom green. When they pull together they make up a water molecule as shown in figure B. Color the entire water molecule in figure B blue.

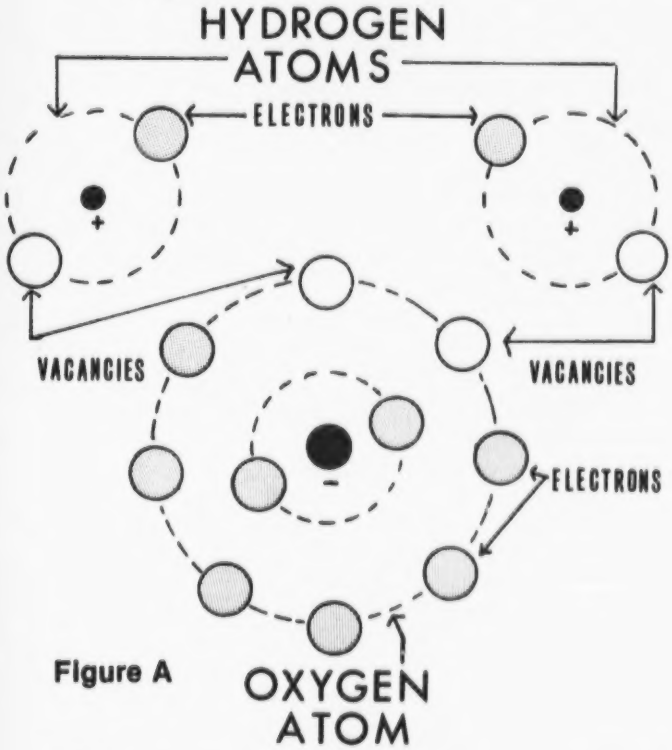


Figure A

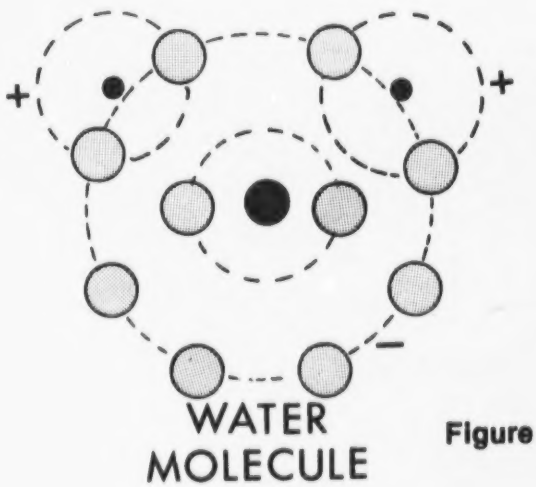


Figure B

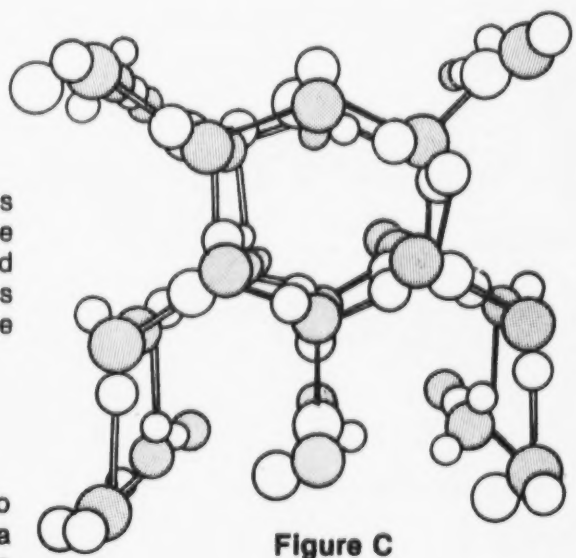
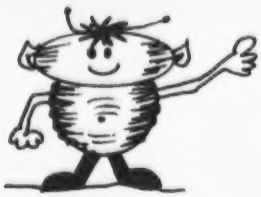


Figure C

The ice crystal in figure C is frozen water. It has six sides held together by hydrogen bonds. Write an *H* on all white circles, an *O* on the shaded circles. Together, each set of three atoms makes up a water molecule. Color the bonds that hold the water molecule together blue.

Throughout this book, we have pulled together to form a bond of friendship like the bonds found in a water molecule. To show this bond, insert sheet in a plastic bag. With an eyedropper, place water on each circle. Connect the circles with water to show bonds that hold the water molecule together. Then try to form a bond of friendship with at least one person today. Describe your attempts in your PAL.

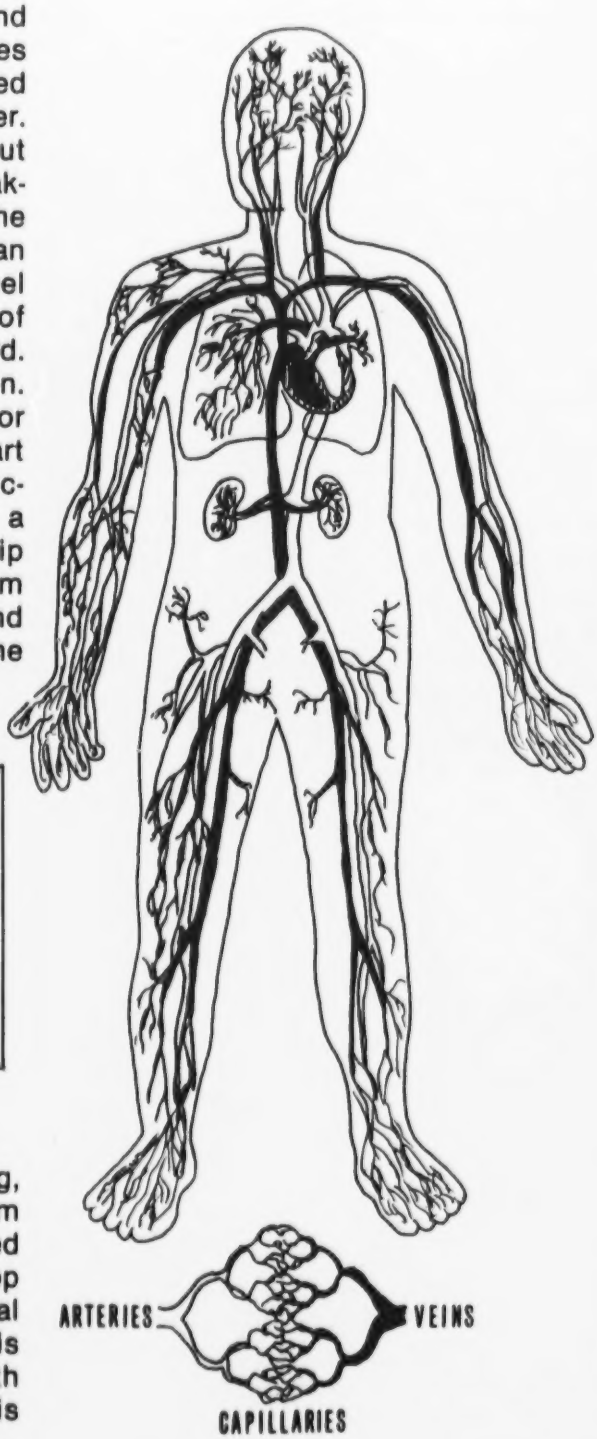


And You...

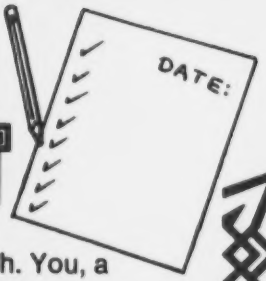
In the last activity I learned that *atoms* of chemical *elements,* like people, often bond together. In water, bonds hold water molecules together. In people, the most common bonded molecule is water which holds people together. Water, found in blood, is pumped throughout the body by the heart. You can feel this by taking your pulse. First, place your finger on the picture where one would feel the pulse. Mark an *X* on these spots. Then with your finger, feel these spots on your body. Count the number of times your heart beats in one minute. Record. Run in place for one minute. Count again. Record. Did your pulse rate increase or decrease? How long does it take for your heart to return to its beginning pulse rate? In the picture, locate the heart. Pretend that you are a drop of blood. With a pencil, trace the round trip path of your drop of blood as it flows away from the heart in arteries, through capillaries and returns to the heart in veins. Find out the distance you traveled throughout your body.

ACTIVITY:	NUMBER OF BEATS
AT REST:	_____
AFTER EXERCISE:	_____
RECOVERY TIME:	_____

Place sheet in plastic bag. With food coloring, make some red and blue colored blood from water. With extreme care, trace a drop of red blood from the heart to the capillaries, a drop of blue blood back to the heart. NOTE: In real life, blue blood does not exist. It's color is dark red. I will remember you as a person with a caring heart after you have completed this activity.



FAREWELL CHECKLIST

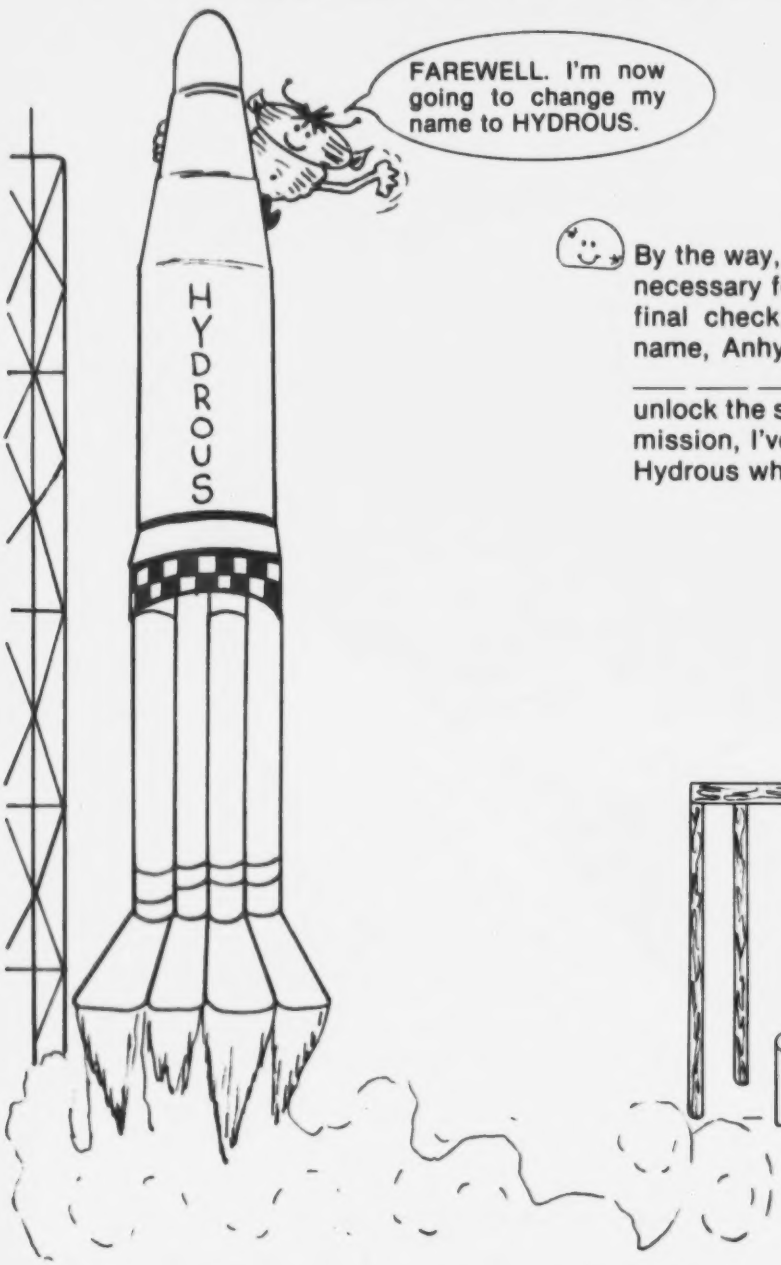


Well, it's time for me to say good-bye. I enjoyed my visit to planet Earth. You, a special agent on this top secret mission, have helped me learn a lot about water. Let's do a final check on what you've helped me learn. Review activity pages in your PAL. Color in a water drop below for each completed activity. Write date completed. Initial the activity as part of the final check before I blast off planet Arid in the great galaxy of Andromeda. Report your results to your teacher and parents.

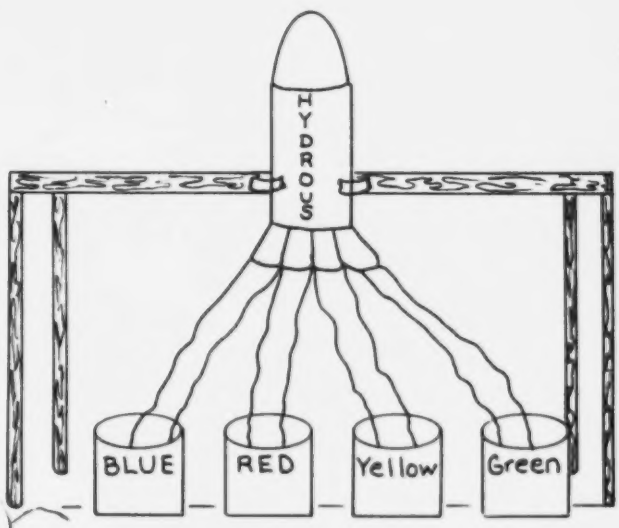
Page	Title of activity	Completed	Date	Initials
	It's important to record complete date, day/month/year, on important documents.			
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				

LIFT OFF TO PLANET ARID

Now that you have completed the farewell check, help launch me safely from planet Earth to planet Arid. During my stay on planet Earth, I learned that everyone, including me, needs water to live. Cut out my spacecraft below. Tape to the edge of a table or desk. Hang strips of blotter or filter paper or paper toweling from each of its four engines. Place ends of strips into containers of different colored water. Observe carefully. Pretend that when the colored water reaches each engine, the engine will fire and send me on my way. On the other side of this paper, record how long it took the colored water in each container to rise and then fire the engines. Observe the different colors in the blotter paper. Define the word *chromatography.* Tell how it is used in our lives. Then write a farewell letter to Hydrous. Explain how you felt when he/she blasted off from planet Earth.



By the way, you have taught me that water is necessary for all life. That includes me! As a final check, you can remember me by my name, Anhydrous, which means NO W ___ ___ ___ ___. Because you have helped me unlock the secrets of water on this top secret mission, I've decided to change my name to Hydrous which means W___ ___ ___ ___.



28

TEACHER/PARENT GUIDE

GREETINGS

Activity Page Number 1

Concept: space travel, space terms, water, career awareness

Materials: pen or pencil, one activity sheet per student

Procedure: Discuss our galaxy, the Milky Way galaxy, as being one of many galaxies found in the universe. Tape-record "Greetings" and play back to class as initial, motivating activity for top secret mission. Discuss mission. Stress importance of completing application blanks correctly when applying for any position.

Answers: Will vary with completed applications.

CONGRATULATIONS!

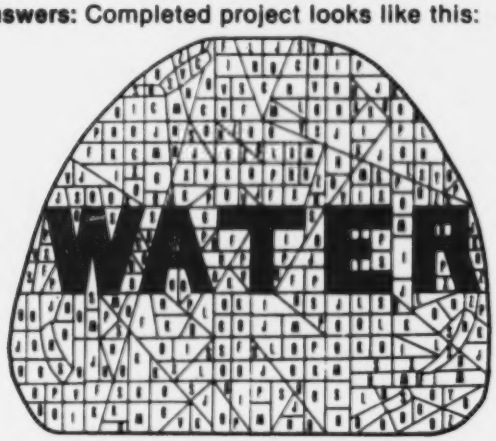
Activity Page Number 2

Concept: water, experimental equipment, career awareness

Materials: pencil, one activity sheet per student, listed materials

Procedure: Discuss qualifications an astronaut needs to travel on space missions. Have youngsters complete exercise. Discuss importance of water to maintain life on earth. Gather necessary equipment gradually for water study. Some youngsters may live in various types of housing where water bills are not issued to tenants. A sample water bill could be used in this case. Paper toweling can be used if blotter or filter paper isn't available. Point out that all equipment need not be collected immediately to begin the study of water. Rather, youngsters can be on the lookout for such equipment as they do the activities in the book.

Answers: Completed project looks like this:



FOLLOW DIRECTIONS

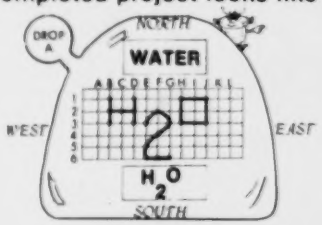
Activity Page Number 3

Concept: water symbol, molecule, atom, hydrogen, oxygen

Materials: pencil, one activity sheet per student, plastic bag, eyedropper, plain tap water

Procedure: Read and follow directions carefully. Use map to introduce grid activity. Point out grid marks used to locate youngsters' city on a city map. Youngsters do written activity by following directions carefully. Reinforce with actual water activity in which drop of water is pulled from drop A to dot B1. Add other drops to dots and connect with water to form symbol H_2O. Be sure to remind youngsters that they will next use pages 4 and 5 to make front and back covers for their water books.

Answers: Completed project looks like this:



MY PAL: PERSONAL ACTIVITY LOG

(front cover)

Activity Page Number 4

Concept: record keeping booklet, classified mission and documents, arid environments

Materials: scissors, glue, stiff cardboard (8 ½" x 11" from back of writing tablets) or tagboard, laminating machine if available, one activity sheet per student

Procedure: Have youngsters cut activity sheet into designated sixteen squares. Rearrange puzzle pieces to make complete picture. Check youngsters' pages before gluing. Glue pieces in place onto cardboard or tagboard. Add names of students, school and the date youngsters "classify" their books. Color. Decorate. Use as front cover for Student Book. Discuss the use of the Personal Activity Log (PAL), for example, covers between which completed sheets can be stored and a place for notes and drawings. Discuss nature of top secret missions. Also, discuss arid environments and the nature of such. Duplicate page 5 to use as back cover of Student Book. Follow same procedure. Laminate both covers. Tape front cover to back cover and use as a folder for completed pages to make a complete Personal Activity Log. Youngsters can also use a three-ring binder for this purpose.

Answers: Completed project looks like this:

MY PAL: PERSONAL ACTIVITY LOG

(back cover)

Activity Page Number 5

Concept: record keeping booklet, declassified missions and documents, watery environments

Materials: scissors, glue, stiff cardboard (8 ½" x 11" from back of writing tablets) or tagboard, laminating machine if available, one activity sheet per student

Procedure: Follow same procedure as done for activity sheet number 4. Laminate and use as back cover for Personal Activity Log (PAL). Discuss nature of open, declassified, missions. Also discuss watery environments and the nature of such. Compare to outer space environments. NOTE: Activity sheets 4 and 5, when taped together, make up the front and back covers of the student Personal Activity Log (PAL).

Answers: Completed project looks like this:

WATER'S WAY

Activity Page Number 6

Concept: major world features and events

Materials: colored pens or pencils, reference materials, one activity sheet per student, plastic bag, eyedroppper, plain tap water

Procedure: Identify major water feature nearest home. Discuss whether feature is an ocean, sea, gulf, bay, lake or river. On the map, point out how water covers nearly three-fourths of the earth's surface. Have youngsters use reference materials to complete written activity. Reinforce with water activity. Discuss famous stories and songs that feature ships lost at sea such as the *Edmund Fitzgerald*. Famous naval battleships such as the *Monitor* and *Merrimack*, which fought in the first battle that featured iron-clad ships powered by steam, can also be discussed.

Answers: 8 Arctic Ocean, 1 Pacific Ocean, 2 Atlantic Ocean, 15 Indian Ocean, 6 Hudson Bay, 3 Gulf of Mexico, 9 Mediterranean Sea, 11 Red Sea, 5 Mississippi River, 7 Amazon River, 16 Congo River, 12 Ganges River, 10 Mekong River, 13 Yangtze River, 14 Nile River, 4 Great Lakes

OFF THE DEEP END

Activity Page Number 7

Concept: ocean features, bathysphere, displacement, Cartesian diver, water pressure

Materials: string, ruler, plastic bag, eyedropper, plain tap water, plastic soda container, dictionary, one activity sheet per student

Procedure: On a world map, locate Mariana Trench near island of Guam in the Pacific Ocean. Compare to location on activity sheet. Discuss uneven ocean floor features. Youngsters measure with a ruler or string the depth of the trench on the activity sheet. Record. Do water drop craft activity. Write story with incomplete ending. Let others finish story. Culminate activity by making plastic soda bottle Cartesian divers. Study water pressure, buoyancy, displacement and sonar waves as an extension to this activity.

Answers: Depth of Trench: 36,198 ft. (11,033 m)
String length of Mariana Trench: 3.6 in. (9.0 cm)

ONCE-IN-A-LIFETIME TRIP

Activity Page Number 8

Concept: major U.S. water features and regions, state abbreviations, zip code, acid rain

Materials: string, ruler, encyclopedia, almanac or zip code directory, plastic bag, eyedropper, plain tap water.

Procedure: On a U.S. map, locate the Mississippi River. Discuss how water runs off land, flows into rivers which empty into oceans. Youngsters measure the length of the river in inches (cm) with a string and find its actual length in miles (km). Do water drop activity. Some youngsters may trace the route traveled on favorite vacations or color in other rivers. Complete abbreviations and zip code activities. Identify states with ample water supplies versus those in which a water shortage exists. Have youngsters design ways to alleviate water shortages in desert-related states. A water pipeline, transporting icebergs from the Arctic Ocean and desalinating

oceans are three such ways. Discuss effects of "acid rain." Stress the importance of keeping water clean and using water wisely. Have youngsters write abbreviations for other states on map.

Answers: River in inches = 3.6 (9.0 cm)
Actual river in miles = 2348 mi. (3779 km)
One inch on map = 587 mi. (945 km)
Zip code for New Orleans is 70113.
Completed activity sheet looks like this:

HOME SWEET HOME

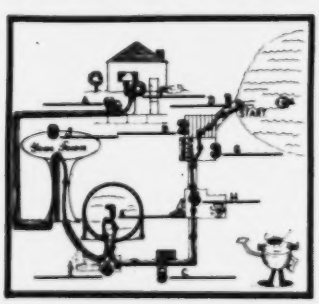
Activity Page Number 9

Concept: sources of water, water treatment, cost of water

Materials: pencil, one activity sheet per student, plastic bag, plain tap water, eyedropper, water bills

Procedure: Starting at the lake, youngsters connect dots to show the route of water to home. Discuss how water comes from a lake or underground well and can be recycled to be used again. Introduce sample water bill after youngsters have completed water activity. Calculate amount of water used and the price per gallon (liter). Fluoridation of water can also be discussed. Using pizza wheels for dials, teach youngster show to read their home water meters. Calculate usage and cost per month for both water and sewage if applicable. Extend study with a discussion of differences between hard and soft water and the role of a water softener in the home.

Answers: Completed activity sheet looks like this:



1. Approximately 50-75 drops to fill lake.
2. Approximately 7500-10,000 gallons (28,500-38,000 liters) per month for a family of four to six people.
3. Will vary with location but the following may be used as a guide: 1.5¢ per 10 gallons (38 liters), 15¢ per 100 gallons (380 liters), $1.50 per 1000 gallons (3800 liters), $15.00 per 10,000 gallons (38,000 liters) excluding sewage costs.
4. Will vary with locations but the following may be used as a guide: 2.5¢ per 10 gallons (38 liters), 25¢ per 100 gallons (380 liters), $2.50 per 1000 gallons (3800 liters), $25.00 per 10,000 gallons 38,000 liters).
5. Will vary with location, total bill for #3 and #4 above would be $40.00 per month.

OFF TO SCHOOL!

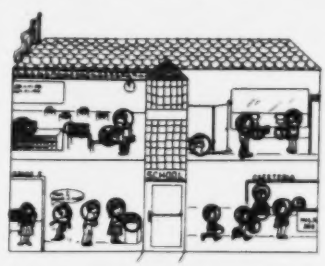
Activity Page Number 10

Concept: locations and uses of water at school

Materials: pencil, one activity sheet per student, dictionary, plain tap water, eyedropper

Procedure: Discuss how water is hidden in many things on Earth, some of which include rocks on land, plants of all kinds and in the air. Youngsters should realize that water, although sometimes hidden, is essential for all life to exist on Earth. Complete activity sheet. Circle hidden water objects with water. Have youngsters tell about what these circles might represent. The total number of water objects is 26. On the reverse side of the page, give youngsters an opportunity to develop their own hidden word puzzles that feature names of water-related objects.

Answers: Completed activity sheet looks like this:



STRENGTHS

Activity Page Number 11

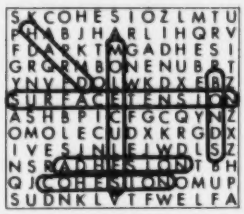
Concept: characteristics of water, self-concept

Materials: pencil, one activity sheet per student, plastic bag, eyedropper, plain tap water

Procedure: Review youngsters' strengths found in the application blank on page 1. Compare words that identify both physical and nonphysical strengths, for example, weightlifting versus honesty and courage. Have youngsters use clues to complete written activity by filling in blanks with correct letters. Do water activity. Remind youngsters to do one word at

a time, then collect drops before doing next word. Add up total number of drops. Record the average number of drops per strength word. Have youngsters alphabetize and define each word. Discuss additional physical and nonphysical strength words and what they may mean to a person.

Answers: Completed activity sheet looks like this:



Clues: 1. soft (10), 2. molecules (15), 3. bonds (12), 4. adhesion (15), 5. cohesion (15), 6. surface tension (22). **Note:** Number of drops per word is found in ( ) after each word above. Total number of drops is approximately 90 drops. Average number of drops per word is about 15 drops.

WEAKNESSES

Activity Page Number 12

Concept: characteristics of water, self-concept

Materials: pencil, one activity sheet per student, plastic bag, eyedropper, plain tap water, liquid soap, magnifying glass, food coloring, crayons or markers

Procedure: Review youngsters' weaknesses found on page 1. Point out that all things have certain weaknesses which can be either physical or nonphysical. Discuss how certain substances, or the lack of them, can make one feel weak. Compare to soap in water. Have youngsters rearrange letters in box A to form word *soap* in box B. Youngsters then do water related and ensuing activities. Be careful to point out how all things, like water, have some weaknesses, but these weaknesses, can be corrected with further practice.

Answers: Box B = soap. Soap causes water to change color. Soap bubbles are also formed. Water becomes weak as soap is added because bonds between molecules of water are broken down and weakened.

WATER FUN

Activity Page Number 13

Concept: surface tension of water, self-concept

Materials: pencil or pens, plastic bag, eyedropper, plain tap water, soapy water, liquid soap, scissors, glue or tape

Procedure: Discuss how all living things need water to live. Ask youngsters to identify what the youngster is asking for in the picture. Water. Review water symbol. Do water activity. Youngsters can pull drops along the marked scale or hold activity sheet upright for water run-off. With scale as a background, drops of tap water, soapy water and liquid soap can also be dropped onto wax paper. Note number of spaces stream travels before it breaks up into drops. Record. Discuss surface tension. Conclude activity by having youngsters write jokes, riddles or bumper stickers.

Answers: Number of drops to fill glass in picture = approximately 5 drops. Answers will vary but regular tap water should hold together longer than soapy water or liquid soap because the bonds between regular tap water molecules are stronger.

HANGING IN THERE. . .

Activity Page Number 14

Concept: water hangs from many objects, water observations and characteristics, self-concept

Materials: pencil, one activity sheet per student, plastic bag, plain tap water, soapy water, string, glue, construction paper, scissors, old magazines

Procedure: Discuss famous people such as Helen Keller, Babe Didrikson, Ludwig van Beethoven, and Franklin D. Roosevelt who overcame incredible odds to achieve success. Discuss the meaning of the code phrase "hang in there." Youngsters do written activity. Complete water activity. Youngsters are able to fit more regular plain tap water drops than soapy water drops in the drops. Mobiles that feature pictures of water-related objects can be hung for all to see. Discuss the role that balance plays in a mobile and in sports.

Answers: (a) Barbed wire, (b) Tree branch or twig, (c) Eyedropper, (d) Blade of grass or stalk of celery. Regular Water Drops: A 5, B 10, C 5, D 12. Soapy Water Drops: A 1, B 9, C 4, D 10. Number of drops will vary with type of eyedropper used.

CHANGES IN STATE

Activity Page Number 15

Concept: solid, liquid, gas, self-concept

Materials: pencil, one activity sheet per student, plastic bag, ice cube, stopwatch, clock or watch, tape or glue, scissors, old magazines, child photographs, construction paper, writing paper, stapler

Procedure: Introduce activity by having youngsters capture some air in their plastic bags. Compare captured air with air in the cloud. Have youngsters do written activity. Give each youngster a *small* piece of ice. Place on solid (snowflake). Youngsters time and record melt time in the liquid drop. Discuss droplets of water that form on the side of glass filled with water and ice cubes on a hot summer day. Compare to changes that youngsters have gone through in their lives. Pictures can be drawn or collected and placed in chronological order in a diary or scrapbook. Label each with correct age and date of occurrence.

Answers: Solid, Liquid, Gas
Melting times will vary with size of ice cube and local conditions.

CHANGES IN IMAGE

Activity Page Number 16

Concept: magnification, lenses, surface tension, self-concept

Materials: pencil, one activity sheet per student, pennies, reference materials, plain tap water, magnifying glass, eyeglasses, spoon

Procedures: Introduce lesson by having a volunteer student observe an object with a magnifying glass. Discuss how the magnifying glass makes things look larger. Explain to youngsters that water too can be used as a magnifying glass. Complete both written and water activities. Extend activity as youngsters count the number of plain and soapy water drops that can be placed on the head and tail sides of an actual penny. Draw "heapiness" of water in each case and point out how plain tap water heaps higher because of its greater surface tension. Plan for the future by making fifteen-year time lines that include a flight plan to planet Arid. Time capsules could also be used for this purpose. Write to the World's Future Society, and ask for information on future changes in the next fifteen years. The address is World Future Society, 4916 St. Elmo Avenue, Bethesda, MD 20814.

Answers: 1973, Denver. Water magnifies image.

WATER: THE CYCLE OF LIFE!

Activity Page Number 17

Concept: water cycle, values

Materials: pencil, one activity sheet per student, plastic bag, eyedropper, dictionary, plain tap water, plastic soda bottle, ice cubes

Procedures: Review the three states of water on page 16: solid, liquid, and gas—and how water goes through cyclical stages. Complete written water cycle activity—evaporation, condensation and precipitation. Discuss each stage. Complete 1-2-3-4-1 cycle. Use plastic bottle and ice cubes to set up water cycle. A heated teakettle placed under a cookie sheet that holds ice cubes also works well. Discuss its three phases. Compare to condensation of water on a small sheet of plastic placed over grass on a hot summer day. Discuss the recyclying of body parts such as heart and kidney transplants before youngsters make bumper stickers. Compare organ donation to water cycle. In each case, objects pass through changes and cycles.

Answers: evaporation, condensation, precipitation

RECYCLE WATER!

Activity Page Number 18

Concept: water conservation, self-concept

Materials: pencil, one activity sheet per student, comb, small plastic medicine cup, dictionary

Procedure: This activity stresses the importance of water conservation. Discuss the meaning of the word *conservation*. Youngsters write definition of water conservation. If available, set classroom water faucet so it leaks water at a rate of one drop per second into small graduated medicine cup often obtained free from hospitals. In approximately 25 seconds, the faucet will have leaked 1 ml (25 drops) of water. Youngsters place one drop in each of three drops on activity sheet. Tilt page and allow water to run into medicine cup. Do for 25 drops which is a minimum equivalent to 1 ml of water wasted in 25 seconds. There are 1000 ml or 25,000 drops or more of water in one liter. One liter of water is wasted every 7 hours, 3.5 liters every day, 24.5 liters per week and 1274 liters per year at a rate of one drop per second. Stress the importance of conserving water. Compare conservation of water to using time wisely in one's lifetime.

Answers: A minimum of 1260 liters (325 gallons) of water wasted per year from a faucet that drips one drop of water per second assuming 1 ml of water is equivalent to 25 drops.

WATER SPORTS

Activity Page Number 19

Concept: water sports, recreation facilities

Materials: pencil, one activity sheet per student, scissors, glue, crayons or markers, thin wire, plain tap water, soapy water, small box

Procedure: Introduce activity with a discussion of types of sports found in an Olympic village. Identify water-related sports. Have youngsters use the picture clue to name each water sport. Identify as summer or winter sport or both. Cut out pictures and glue to frames. Assemble. Pull through small cereal or crayon box. Make thin wire loop. Dip in water. Use as magnifying glass to examine each frame. Have youngsters write a letter to the U.S. Olympic Committee, 1750 East Boulder Street, Colorado Springs, CO 80909 asking for further information on Olympic sport activities. Extend water loop activity into soap bubble blowing contest and relate to domed stadia.

Answers: 1. Surfing (S), 2. Fishing (S,W), 3. Scuba Diving (S), 4. Boating (S), 5. Swimming (S), 6. Waterskiing (S), 7. Downhill Skiing (W), 8. Cross-country Skiing (W), 9. Sailing (S), 10. Snowmobiling (W)

WATER OBJECTS. . .

Activity Page Number 20

Concept: some objects need water to operate

Materials: pencil, one activity sheet per student, plastic bag, eyedropper, plain tap water, reference materials

Procedure: If possible, have youngsters observe a coffeepot that when filled with various amounts of water will make a pre-determined number of cups of coffee. Discuss how water is used to mix ingredients such as frozen orange juice to liquid orange juice. Youngsters write the name of each object in the blank. Then fill each object to the proper level with drops of water. Record, in the box, the number of drops for each item. Have youngsters try to find out how much water each object actually holds. Approximate volumes are listed below.

Answers:

Object	Drops on Picture	Actual volume
1. Car radiator (with overflow tank)	150-190 drops	Approx. 8 quarts (7.60 liters)
2. Washing machine	50 drops	30 gallons (110 liters)
3. Iron	2 drops	1 cup (124 liters)
4. Toilet	40 drops	3-5 gallons (11-18 liters)
5. Hot water heater	60 drops	40 gallons (150 liters)
6. Coffeepot	8 drops	5 quarts (4.80 liters)

ONE LAST GLIMPSE AT WATER

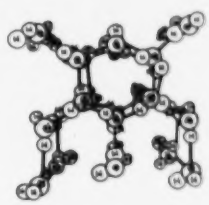
Activity Page Number 21

Concept: molecule, bonds, water expands when frozen, self-concept, friendship

Materials: pencil, one activity sheet per student, crayons or colored markers, plastic bag, eyedropper, plain tap water.

Procedure: Review H_2O symbol found on page 3. Discuss how 2 atoms of hydrogen and 1 atom of oxygen make up one molecule of water. Color atoms and bonds. Compare chemical bonds to bonds of friendship. After youngsters have placed water on the hydrogen bonds to form an atom of oxygen, have them dramatize the action of these bonds by pulling together as in Tug-of-War.

Answers: Completed project sheet should look like this:
H's on white circles, O's on shaded circles



AND YOU. . .

Activity Page Number 22

Concept: over one-half of the body is water composition of blood, circulation

Materials: pencil, one activity sheet per student, crayons or markers, plastic bag, eyedropper, plain tap water, food coloring

Procedure: Discuss how water makes up 65 percent of the body. Have youngsters determine the weight of water in their bodies. Discuss elements found in blood and how blood is pumped throughout the body by the heart. Have youngsters take pulse before and after exercise. Note heart rate. Youngsters color arteries, veins and capillaries with appropriate colors. Note: Emphasize that "blue blood" is deoxygenated blood. Its color in real life however, is *not* blue; rather it's dark red. Mix food coloring and water for desired colored drops. With an eyedropper, trace blood throughout body. This can also be demonstrated by using transparency of activity sheet on overhead projector.

Answers: Arteries colored red, veins blue and capillaries yellow.

FAREWELL CHECKLIST

Activity Page Number 23

Concept: review of water concepts and completed pages, record keeping system

Materials: pencil, one activity sheet per student, crayons or markers

Procedure: Youngsters place completed activity sheets in order to complete their final Personal Activity Log (PAL). Review each page in preparation for culminating activity on page 24. Youngsters color in water drops of completed activities, date and initial each activity on the recording sheet. Emphasize writing of complete dates. Also, stress the idea that all activities need to be completed for a successful launch of Anhydrous to planet Arid.

Answers: Completed record keeping sheet.

LIFT OFF TO PLANET ARID

Activity Page Number 24

Concept: chromatography, absorption, capillary action, anhydrous, hydrous

Materials: pencil, one activity sheet per student, scissors, tape, blotter or filter paper (if not available, use paper towels), tape, food coloring, plain tap water, water containers, dictionary, stopwatch, wristwatch or clock

Procedure: Use this activity as an individiual, small group or large class activity. Cut out four 6 inch (15 cm) x 1 inch (2.5 cm) strips of blotter or filter paper or paper toweling and tape to spacecraft as described. Dangle paper into containers of colored water supported by stack of books. Time rate of ascent for each solution. With blotter paper, separation of colors should become evident as solutions approach engines. Discuss capillary action of water in a tree and the mixing of pigments or various colored paints or lights to produce other colors. Encourage youngsters to follow appropriate letter format when writing to Hydrous. This should include information on how to address an envelope and the use of proper postage for mailing.

Answers: Will vary with type of paper and solution used. Anhydrous means without water, hydrous with water.